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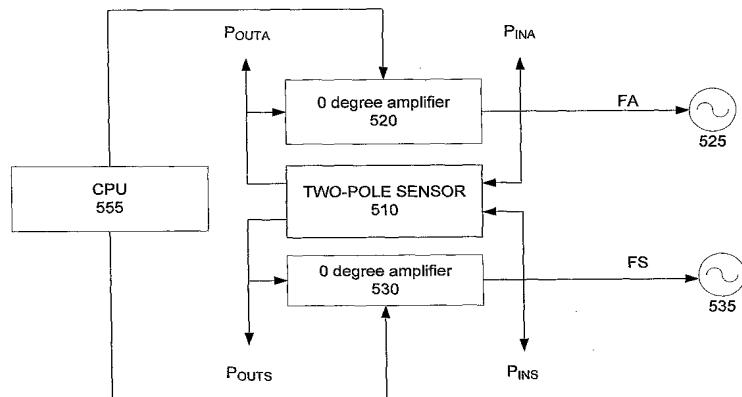
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(54) Title: MEASUREMENTS OF DENSITY AND VISCOELASTICITY WITH A SINGLE ACOUSTIC WAVE SENSOR



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(57) Abstract: A sensor, method and system, for measuring certain characteristics of a fluid. The sensor utilizes a piezoelectric device having at least two tightly coupled resonators providing a two pole electric transfer function responsive to an electrical signal coupled to the input resonator. The piezoelectric sensor has a textured entrainment layer, constructed to entrap a known volume of fluid and impart motion to the entrapped fluid as well as to surrounding non-trapped fluid. The common mode frequency shift of the two resonant frequencies is related to mass loading due to the entrapped fluid, while the energy absorbed by the fluid, or a phase shift of one of the resonant frequencies, is related to the viscosity/density product of the fluid. Extracting the viscosity is a matter of mathematical manipulation. By controlling the energy level of the input electrical signal, the viscosity measurement may be conducted at a predetermined shear rate.